Vol. XLIII. JUNE, 1900.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

INSTITUTED 1852.

TRANSACTIONS.

NOTE.—This Society is not responsible, as a body, for the facts and opinions advanced in any of its publications.

No. 877.

ADDRESS AT THE ANNUAL CONVENTION, LONDON, ENGLAND, JULY 2D, 1900.

By JOHN FINDLEY WALLACE, President, Am. Soc. C. E.

The profession of Civil Engineering, as we now know it, is a child of the nineteenth century. The conception of that child, however, occurred with the earliest dawn of human history. Among the earlier engineers we find mention of Tubal Cain, who followed the mechanical branch of the profession; Noah, who devoted his attention to ship building; Joseph, who achieved great success in the construction of grain warehouses and irrigation works; the unknown Egyptian who conceived, designed and constructed the pyramids, and in whose honor, for all we know, the celebrated figure of the Sphynx may have been erected; Moses, who devoted his energies and lifetime to the transportation of a nation from one section of the globe to another, also giving some attention to hydraulics; and Joshua, who followed a similar line of work and also utilized his engineering talents in the overthrow of Jericho by means of the theory of rhythmic oscillation.

The ancient engineering profession, by whatever name we may call it, probably achieved its highest distinction during the existence of the Roman Empire, through the efforts of the legion of engineers

whose names have sunk into oblivion but the remnants of whose works remain until to-day. The profession, however, has only reached its present strength and vigor during recent years. It would be useless to attempt to name, in the short time at my disposal, the typical engineers of the closing century.

It has been said that the measure of civilization is the measure of success attained in the preservation of food products. It seems that the truer exponent of modern civilization is transportation; for, while the Hebrew wanderer in Egypt was able to preserve his food products for a period of seven years, and his co-workers preserved in their mummies grains of wheat, which, thousands of years afterward, were transported to the fertile fields of Oregon and have since germinated and yielded the famous Mummy Brand of wheat, for which that region is celebrated, neighboring tribes and nations starved, because the only means of transportation in those days consisted of caravans of camels by land, and the shallow vessels which navigated the Mediterranean without a compass.

No one agency has been a more potent factor in the advancement of civilization than improved transportation facilities, and the profession of civil engineering has been the force which has conceived, designed and executed the works and machinery which have furnished the world with these facilities. There is hardly a branch of the profession which does not touch on the principle of transportation. The construction of steamships, harbor and river improvements, docks and wharves, canals, water supply, sanitation, manufactories, the utilization and transmission of power—in fact, it is difficult to name a branch of the profession which does not, either directly or indirectly, bear on the subject of transportation.

The great engineers of this century have been responsible and should receive credit for the conception, design and execution of these works, without which the Americas, Asia, Africa, Australia and the isles of the sea would still be among the uncivilized, unknown or inaccessible portions of the world. While it is true that modern civilization, as applied to those portions of the globe to-day, is only partial and imperfect, the veil of obscurity has been lifted, the door has been opened, and modern civilization, guided by the hand of the civil engineer, has only to step forward and take possession of the heritage of mankind.

It behooves us, however, as members of this most noble profession, to realize the responsibilities resting upon us and appreciate the magnitude of the labors before us, and to prepare ourselves for the task; and in doing this to carefully observe our past failures and shortcomings. We should realize that our future success depends upon our full knowledge and appreciation of our past errors. We should discover those qualities in which we are lacking, and endeavor to supply and supplement our deficiencies, in order that we may be better fitted to assist our profession in successfully following out its manifest destiny.

The pioneer engineers of the century were strong, rugged characters, educated in the school of adversity, who lived close to Nature's heart and were keen observers of natural phenomena. They possessed strong imaginations, daring originality, faith in their convictions. These pioneers were followed by a class of engineers who were the students of their predecessors, and who supplemented their own talents and advantages by a study of the methods and the fund of knowledge accumulated by those who lived before them. This latter class has been followed by a generation of engineers who have had the benefit of the larger fund of accumulated engineering wisdom and experience, supplemented by academic and technical education; until now, the young man choosing the engineering profession has before him opportunities, easily accessible, of acquiring the highest scientific and technical education, and entire libraries devoted to the description and elucidation of engineering works and methods, from which to gain an accurate knowledge of the great works which have been accomplished by other members of the profession in all countries, and from which he can derive material for the formation of his own plans. From this vast storehouse of accumulated facts, easily accessible throughout the world, he should be able to steer clear of the errors and avoid the failures of older engineers, and should be able to achieve a higher measure of success.

It has generally been understood that mathematical ability of a high order is a fundamental requisite to success in the engineering profession. This is not necessarily true, as it frequently happens that the person in whom mathematical ability of the highest order exists, is deficient in other essential qualities. While the successful engineer should be a good mathematician, should be a man of integrity, industry

and resources, there are other qualities which cannot be ignored. The engineer who constructs a bridge, no matter how carefully he may design and construct his masonry foundations and steel superstructure, would not be considered an engineer, in the true sense of the term, should he neglect the hidden vein of quicksand, which might eventually cause the destruction of the entire bridge.

Among the underlying qualities necessary to the highest success in our profession are: the ability to accurately observe natural phenomena; a faculty of mentally picturing things in their proper relation to each other; good business judgment and sense; a careful study of business methods; tact, which to some men means so much and to others so little; personal loyalty, not only to the enterprise in which he is engaged, but also to his immediate superior; and, above all, the engineer should not neglect the fact that "The proper study of mankind is man."

In the technical schools of the present day much time is spent in considering the strength of materials, the applied mathematics in the investigation of forces; but nothing in relation to the mental and moral constitution of man, which is the live material that engineers must use in fitting Nature's raw products to the work in hand. There is too much of a tendency among engineers to-day, as ever, to consider the profession entirely a materialistic one, and to confine the education of the young engineer to a knowledge of materials and their uses, to the exclusion of the mental and spiritual.

The prevailing law of matter is inertia. The prevailing principle of the engineering profession is life. The application and direction of the life principle to matter, in order to overcome its inertia, change its form and adapt it to our needs, is the problem. Neither factor can be ignored, above all the life principle. There is too much of a disposition on the part of our profession to value too highly what are the tools of our trade; to forget for a moment that they are simply tools, and fail to appreciate the energizing factor and the mental make-up of the engineer.

It is not the most expert bookkeeper who becomes the most successful banker or merchant, no matter how important carefully kept accounts may be to the success of a bank or mercantile business. It is not the surgeon who has the finest set of instruments, or even the greatest knowledge of their uses, who is necessarily the most success-

ful. It is not the lawyer who has read the most law, but the one who can discriminate and apply his knowledge to the case in hand, who is the best jurist. So it is not the engineer who is the most expert mathematician, the finest draftsman, or who may design and calculate the most beautiful structure, who is the most successful.

The true engineer of to-day is the one who, seeing a necessity arising in the onward march of civilization, can think out its solution, conceive a project, design the necessary works connected therewith, and carry out the scheme as a whole to a successful issue; at the same time convincing his fellow-men of the necessity for the work, the efficiency and economy of his design, and his own ability to accomplish the desired result.

The surplus labor of the past is the capital of to-day. The conservation and preservation of that capital is a necessary factor in promoting modern civilization.

Our works should increase the comforts of mankind, "cause two blades of grass to grow where one grew before," enable persons and property to be carried greater distances in shorter periods of time, with increased comfort and convenience and at the least possible expense. The economy of labor should be the ultimate object to be attained.

The best engineer is not necessarily the one who will design and construct an elaborate bridge across a mighty river, but the one who will design and construct such bridge so as to give the greatest amount of facility for transportation over it at the least possible expense. I have in mind a bridge over a great stream in America which, with its auxiliaries, was constructed some years ago at an expense approximating ten million dollars. It brought a national reputation to its engineers. I have in mind another bridge, located within five miles of the same structure, which, so far as railroad traffic is concerned, performs the same functions but cost one-tenth the amount of money. The construction of this latter bridge was a mere incident in the career of the engineers who designed and superintended the work, and it has brought practically no addition to their fame.

In comparing the works of engineers, that engineer is the best who designs and constructs, results being equal, in such a way that the interest on capital invested, together with maintenance charges and

operating expenses, are a minimum. It is certainly poor engineering to construct works so massive and with such a surplus of strength and solidity that the interest on the original amount invested far exceeds the cost of repairs, renewals and interest on a differently designed work which would perform a similar service.

In this I think the engineers of the Old World can learn from those of the New. On the other hand, in the construction of works of a permanent nature, so as to reduce the cost of operation, maintenance or renewal, the New World can certainly learn from the Old. During the past century, however, the problems which have confronted the engineers of the Old and New Worlds have been vastly different. Works have been constructed in the Old World to meet existing and stable conditions; in the New World, works have been provided to create conditions; consequently, it has been necessary for engineers in the New World to have not only vivid and correct imaginations, and to be able to judge of possibilities and future requirements, but to design and construct their works in such a way as to bring about the desired results with a limited amount of labor and capital.

It has not been a question of choice between what was best or even most economical; the main question has been one of what it was possible to do under the circumstances. Frequently, it was a case of the engineer creating the circumstances. Conditions, however, are rapidly changing, and the engineer of the New World is following closely in the footsteps of the Old World engineer, and his works are gradually becoming more substantial and permanent.

While it is not only desirable, but necessary, that the independent units of our profession, in the form of the individual engineer, should reach the highest state of efficiency, it is also necessary for the highest success that these units be combined. The closing century has witnessed gigantic combinations in the financial and industrial interests of the world. In the engineering profession, the engineers of the British Empire have organized the Institution of Civil Engineers and made it the leading engineering organization of the civilized world. The last half of the century has seen the birth and vigorous growth of our own organization, the American Society of Civil Engineers. Engineering organizations in France, Germany and other countries have also brought engineers together and tended to advance the standard of our profession.

In America, numerous local organizations have been perfected at secondary centers of population, which have done much to furnish engineers within their environment with the encouragement and strength due to association with their fellows. A strong tendency has also existed to form societies in the line of special engineering. These different organizations all have their functions. They are, however, restricted in their influence, and while engineers may be and should be benefited by a connection therewith, they should not forget that the American Society of Civil Engineers construes the term "Civil Engineer" in its broadest sense, and embraces all specialties and subdivisions of the engineering profession. While a connection with local or special organizations may benefit the individual engineer, the greater measure of benefit to the profession at large can be derived from affiliation with the more representative national body. It is through the national organization that we must expect to secure proper recognition for our profession.

Engineers in America do not appreciate the importance of this subject as fully as they should, or as much as their English brethren do, but they are becoming rapidly educated in this direction. As an instance of this, several years ago an engineer was sent to Australia in the interest of an American bridge company. He asked for a hearing before a certain commission which had charge of an important piece of engineering work. The first question asked him was, whether he was a member of the Institution of Civil Engineers of Great Britain. He replied that he was not. He was then asked if he was a member of the American Society of Civil Engineers. He gave a like answer, after which there fell upon the conference a silence that impressed him with the fact that he would have no standing as an engineer in that country unless he was connected with one or the other of these great bodies. He immediately cabled his principals that it would be impossible for any representative of their company to succeed in that quarter of the globe as an engineer unless he was affiliated with one of the national organizations.

I cite this instance in order to impress not only upon the members of the Society but upon American engineers generally, the importance of the fact that these organizations have a higher standing in the eyes of the lay public than they sometimes have in the eyes of the individual engineer.

The point I desire to make and emphasize is the importance and responsibility of the engineering profession in relation to the advancement of civilization, and the fact that it is our duty, first, to fit ourselves as individuals in every possible way for the responsibility placed upon us, and secondly, that we should combine individual units in organization; that it is the duty of the engineer first to fit himself for his individual work, and next to combine with his fellow engineers for the strengthening and elevating of the profession.

From time to time much has been said in relation to engineering ethics, and suggestions have even been made that they be formulated. We should not forget that engineering ethics are simply business ethics, and that the foundation of all ethics is the golden rule, which we should individually endeavor to observe and practice.

This year and to-day will mark an epoch in the history of the American Society of Civil Engineers. This Society holds the same relation to America that the Institution of Civil Engineers holds to the British Empire. With grateful appreciation and profound respect we have accepted the invitation of the Institution of Civil Engineers, and hold our Thirty-second Annual Convention in this house, the home of the greatest engineering association in the world; and we feel warmly the kindness and sympathy which this invitation implies upon the part of our elder brothers. We hope that this meeting will have the effect of not only strengthening the bonds between the different branches of the Anglo-Saxon race, to which most of our members belong, but also of strengthening the larger bond which should unite all mankind and bring about the ultimate acknowledgment of the common brotherhood of man. This grand consummation of our labors, whether we realize it or not, is the ultimate destiny of our profession.

MEMOIRS OF DECEASED MEMBERS.

POMEROY P. DICKINSON, M. Am. Soc. C. E.*

DIED OCTOBER 4TH, 1895.

Pomeroy P. Dickinson was born in Rochester, N. Y., March 15th, 1827, his father, Patrick Peebles Dickinson—a descendant of the Colonial Dickinsons, of Massachusetts—having removed to that city from Amherst, Mass., in the year 1814.

His education was derived from the schools of the period, and finished at the Rochester University, under Dr. Dewey, in 1843. His tastes led him to adopt the profession of engineering, his first experience having been gained in 1845, on the Newburg Branch of the New York and Erie Railway. A diligent student, a persistent and conscientious worker, he rapidly rose through the various grades, reaching at an early age a position which marked him as a leader in his chosen profession. He held many positions of honor and trust, among them being that of Chief Engineer of the following enterprises: Eagleton Coal and Railroad Company, of Pennsylvania; Poughkeepsie and Eastern Railroad; Columbia County Iron Company; Poughkeepsie Bridge Company; Northern Central Railroad (from Baltimore to Sunbury, Pa.); New York and Richmond Coal and Railroad Company, of Virginia, and New York and Long Island Railroad Company. He was also interested in the construction of the main line between Port Jervis and Dunkirk; the distributing reservoir for Poughkeepsie City; the Pontiac Branch Railroad, in Rhode Island; the Atlantic and Richmond Air Line Railroad; the Savannah and Memphis Railroad, in Alabama; the Elberton Air Line Railroad of Georgia; the Cincinnati and S. E. Railroad, of Kentucky, and many other prominent roads.

In 1887–1890, he prepared plans and estimates of the cost of the New York Arcade Railroad, which were examined by engineers of French and German capitalists, sent to this country for this special purpose; the plans and estimates were fully approved by this commission, and the money needed for the first 6 miles of the Arcade road (under Broadway from the Battery to Fifty-ninth Street, with a branch from Twenty-third Street under Madison Avenue to Forty-second Street Depot) was contracted to be furnished; two-thirds of the cost, which was estimated at $20 000 000, was to be furnished by French and

* Memoir prepared by Edward A. Greene, M. Am. Soc. C. E.

German capital, and one-third by American capital. These contracts depended upon the decision of the Court of Appeals of New York State, as to the constitutionality of the charter. The declaring of the charter by the Court as unconstitutional, defeated the early beginning of what would have resulted, certainly before this time, in completed underground rapid transit from the Battery to the Harlem River.

Mr. Dickinson's prominence was not confined to business or professional circles; his social and benevolent relations were extended and widely diffused. A devout member of the Episcopal Church, he led a sincere Christian life. He was senior warden of St. Ann's Protestant Episcopal Church, delegate of the Diocese of New York to the Episcopal Convention, trustee and treasurer of the Endowment Society of St. Ann's Church, vice-president and trustee of the Church Mission to Deaf Mutes, Chairman of the Executive Committee of the Board of Trustees of the Gallaudet Home for Infirm and Aged Deaf Mutes, and one of the Board of Managers of the Protestant Episcopal City Mission Society. He was also a member of the Colonial Club.

As a man he was beloved by all who knew him—of a disposition genial and hearty, yet withal modest and retiring. In the young men of his profession he manifested the deepest interest, extending at all times kindly encouragement, and, when necessary, a helping hand. He recognized to the fullest degree, the brotherhood of mankind, the breadth of his sympathies being attested by his regular Sunday visits to the "Tombs," where he read and talked to the inmates, putting hope into the heart of many an unfortunate, who to-day blesses his memory.

His life was based upon high ideals, up to which he conscientiously lived. His mind was cast in an analytic mould, and whether in the solution of professional problems or the pursuit of abstract knowledge, the love of truth was the incentive to research. He was one of "Nature's Noblemen," and the world is better for his having lived.

In 1853, Mr. Dickinson married Miss Charlotte H. Kirby, who survives him.

Mr. Dickinson was elected a Member of the American Society of Civil Engineers, January 17th, 1872.

ROBERT GILLHAM, M. Am. Soc. C. E.*

DIED MAY 19TH, 1899.

Robert Gillham was born in New York City, September 25th, 1854, being the third son of John and Clarissa Gillham. His father is an Englishman, but emigrated to America in early life, and has held important positions of trust under the Government of the United States.

His mother was an American, from one of the oldest and most respected families of New Jersey.

Having completed a course at a private school in Lodi, N. J., at the age of sixteen, he entered the Institute at Hackensack, N. J. He soon became assistant to Professor Williams, President of the Institute, and under his private instructions continued the study of engineering until 1874, when he began to practice his profession at Hackensack. Here, many problems were entrusted to him, the successful solution of which brought him much special work from New York City.

It was at this time that he was given the problem of utilizing the sulphur in zinc ores. After a most exhaustive investigation of all the methods in use, Mr. Gillham designed a furnace for desulphurizing zinc ores in such a way that, while the value of the zinc was in no way affected, the sulphuric acid gas was used in the manufacture of sulphuric acid. This was a most important step in the economy of zinc production.

Mr. Gillham removed to Kansas City, Mo., in 1878. He quickly saw the advantages of cable traction for the operation of street railways for that city, and at once proceeded to make plans for a cable railway to run from the Union Depot, up the precipitous bluff, direct to the business center of the city. The idea of such a thing was so novel, and the engineering difficulties were apparently so great, that his project was first regarded as chimerical by all those who were in a position to assist him. After many disappointments and discouragements, he succeeded finally in enlisting the necessary capital. His next problem was to obtain a franchise from the city. Here, he encountered the resistance of the horse-railway company, which, notwithstanding its inadequacy, was being operated at a great profit. This resistance, owing to the great local influence of that company, proved, according to Mr. Gillham's own statement, one of the most formidable obstacles encountered in his career. However, with an

* Memoir prepared by R. J. McCarty, M. P. Paret and G. W. McNulty, Members, Am. Soc. C. E.

unexampled tenacity of purpose, he persisted until success had crowned his efforts.

The spectacle of this young man of twenty-five, practically a stranger in a strange land, essaying to solve engineering problems which older heads had pronounced impracticable, proceeding with his task, undisturbed by the strictures of ignorance and undismayed by the immense power of municipal politics which he found arrayed against him, and conducting his enterprise to a pre-eminently successful issue, both in a physical and a financial sense, may justly be held up to all men, both young and old, for emulation.

The complete and astonishing success which finally attended his labors was emphasized, not only by the enrichment of his associates, but also by the adoption of his plans, to its immense profit, by the very company which had so bitterly opposed him.

It is sad to relate, however, that just in the hour of his triumph he was stricken down by an accident which caused him to hover between life and death for many months, when he should have been resting in peace from his labors and enjoying in health and comfort the feeling which comes from the consciousness of important services rendered and arduous duties well performed.

Having recovered his wonted health and spirits, he conceived the idea of an elevated railway over the low lands to the west of Kansas City, Mo., and across the Kansas River to Kansas City, Kans.

Owing to the then undeveloped condition of street-railway traction, he was forced to the use of steam, it not being practicable to use the cable. Having constructed the road west from the Union Depot in Kansas City, Mo., it soon became necessary to extend it eastward to the business center of that city. This called for a tunnel of 700 ft. under the bluff, on a 9% gradient, and made necessary the adoption of cable traction for the extension. The whole work was completed in 1887, but the road, from the necessity of having two kinds of power, and from the fact of its being a little in advance of requirements, did not prove at first a financial success.

About this time he also had charge of the construction of the Omaha Cable Railway, the Denver City Cable Railway, the Montague Street Cable Railway, in Brooklyn, and the Cleveland City Cable Railway, all of which enterprises were based upon the success of Mr. Gillham's Kansas City Cable Railway.

In 1888 he was retained to investigate the problem of changing the motive power of the Boston street railways from horse to cable.

Before he had completed his investigations, however, the practicability of electricity as a motive power for street railways had been demonstrated, and the Boston people decided to adopt that method of traction.

Shortly after this, in connection with the late John A. Wilson, M.

Am. Soc. C. E., of Philadelphia, he made a report relating to an extensive elevated railway system for Boston.

He also visited Europe, and made extensive investigations of the problem of compressed air, in Paris and London.

In 1890 the Kansas City Elevated Railway Company had become involved in financial difficulties, and Mr. Gillham was asked to take charge of the rehabilitation of the property, and was appointed Receiver and General Manager of that company. He at once changed the motive power to electricity, and by his successful management and adroit and able conduct was able, in 1894, to effect a sale of the properties to the Metropolitan Street Railway Company, on terms highly advantageous to those he represented.

He was at the same time Receiver and General Manager of the North East Street Railway Company, of Kansas City, and conducted the affairs of that company to a highly satisfactory settlement.

Mr. Gillham's labors in connection with the receivership and management of the Kansas City Elevated Railway were exceedingly arduous, so much so, in fact, that in the summer of 1894, shortly after the settlement of that company's affairs, he was stricken with nervous prostration, and was compelled to spend some months in recuperation.

In 1895, he accepted the position of Chief Engineer of the Kansas City, Pittsburg and Gulf Railroad Company. At that time this railroad had only been built as far as Siloam Springs, Ark., 230 miles south of Kansas City. By the latter part of 1897, Mr. Gillham had the line completed and in operation through to Port Arthur, Tex., a total distance of nearly 800 miles from Kansas City, and had also built and in operation, about 90 miles of railroad in Missouri, north from Kansas City, and 50 or 60 miles of branch roads in the southern parts of the Pittsburg and Gulf Railroad System.

One great work which Mr. Gillham undertook, was the construction of the Port Arthur Ship Canal, which extended from Port Arthur, Tex., the southern terminus of the Pittsburg and Gulf Railroad, to deep water at Sabine Pass, Tex., on the Gulf of Mexico. This canal is 7½ miles long, 175 ft. wide and 25 ft. deep, and at the time of writing this memoir, but a few months after Mr. Gillham's death, is practically completed. The canal was begun in the latter part of 1896. The engineering difficulties were readily overcome by the foresight and resource of its Chief Engineer, though the opinions of several well-known engineers were against the practicability of the project.

From the first, the enterprise met with strenuous opposition from adverse interests, and the opponents of the canal thoroughly exhausted every known method of resistance, both in and out of the courts. They even succeeded in getting the United States Government to interfere. Mr. Gillham was, however, not only an engineer, but a diplomatist of more than average ability, and having, moreover, a remarkable faculty

of presenting his views and opinions in a plain and convincing manner, he soon broke down all opposition.

In 1896, he was appointed General Manager of the Kansas City, Pittsburg and Gulf Railroad, as well as of the Kansas City Suburban Belt Railroad.

In 1897, in addition to these positions, he also assumed the positions of General Manager and Chief Engineer of the Omaha and St. Louis and the Omaha, Kansas City and Eastern Railroad, and of the Kansas City and Northern Connecting Railroads.

On April 1st, 1899, he was appointed one of the Receivers of the Kansas City, Pittsburg and Gulf Railroad, retaining his position as General Manager both of the Kansas City, Pittsburg and Gulf and the Kansas City Suburban Belt Railroads, but resigning his position on the other roads mentioned.

On April 27th, 1899, as a result of the litigation of the affairs of the Kansas City, Pittsburg and Gulf Railroad, a change was made in the receivership of that company, but Mr. Gillham was, in recognition of his services and abilities, appointed by the Court as General Manager for the new receivers.

But this sphere of routine railroad work, though large, not being sufficient to satisfy his enterprising spirit, he at the same time sought other fields to fill the measure of his energy and talents.

Thus, at the time of his death, he held the following positions:

General Manager and Chief Engineer for the Receivers of the Kansas City, Pittsburg and Gulf Railroad; General Manager and Chief Engineer of the Kansas City Suburban Belt Railroad; General Manager and Chief Engineer of the Port Arthur Channel and Dock Company; President of the Armourdale Foundry Company; Vice-President of the Kansas City Elevated Railway Company; Director in the Missouri, Kansas and Texas Trust Company and the Kansas City, Pittsburg and Gulf Railroad.

He was also an active member of the Board of Park Commissioners of Kansas City, Mo., in which capacity he had done much to develop the park systems of that city.

He was a leading member of the Commercial Club of Kansas City, having, as such, devoted much of his time and energies to the work of that organization.

He was a member of the American Society of Civil Engineers, of the Society of Marine Architects and Naval Engineers, and of the Institution of Civil Engineers of England.

In December, 1881, he was married to Miss Minnie Marty, the daughter of a prominent capitalist of Kansas City. His wife, two daughters and an infant son survive him.

For some time before his death, the condition of his health admonished his friends that he was overworked, in fact, during this

period it would seem that nothing save his enterprising spirit and wonderful recuperative powers had borne him up.

On May 13th, 1899, having just returned from an exhausting tour of inspection over the Kansas City, Pittsburg and Gulf Railroad, he left his office at 6 P. M. as usual. As soon as he reached home he was stricken with a nervous chill, which was followed by pneumonia. His physicians stated that ordinarily he would have easily thrown off the disease, but that in his exhausted condition the worst might be feared. He lingered until 8.30 P. M., May 19th, when he passed peacefully away, surrounded by his family and nearest friends.

Mr. Gillham's interesting and valuable career resulted from a rare faculty to create his own opportunities, from an ability to use the same for the achievement of practical results, from an integrity and loftiness of purpose which directed his powers to the highest and most useful ends, from a genial and engaging manner, concerning the sincerity of which his contempt for all hypocrisy and his many deeds of disinterested kindness left no room for doubt, and from a courage, constancy and energy which left him ever undismayed.

It happened that just before his death he was selected to present a tribute to the memory of a prominent fellow citizen. This tribute contained the following words:

"Nature, having so constructed man that he might not exist without relation to his fellow man, has kindly placed among us some whose mission is to scatter peace and happiness all along the path of life. To every one of these there is a monument built of his own good deeds, and though inscriptions may not be upon it, God will know to whom it was erected."

These words will serve to show the standard of their author's excellence, and his life and deeds proclaim how well he followed it.

Mr. Gillham was elected a Member of the American Society of Civil Engineers, June 2d, 1886.

HORACE HARDING, M. Am. Soc. C. E.*

DIED JULY 29TH, 1899.

Horace Harding was born at Boston, Mass., on May 27th, 1828. He was graduated from Harvard University in July, 1848, and at once began the practice of his chosen profession. His first work was an elaborate survey of Springfield Cemetery, after completing which he joined a party of engineers under Captain John Childe, of Springfield, and went South to take part in the surveys for the Mobile and Ohio Railroad in Alabama and Mississippi. He remained with this company until 1854, and then became Chief Engineer of the Indianapolis and Toledo Railroad, in Ohio. He returned to the engineer corps of the Mobile and Ohio Railroad in 1856, and in the following year went to Missouri, where he combined the real estate business with professional work. He returned to Alabama in 1858, and joined the engineer corps of the North-East and South-West Alabama Railroad.

Mr. Harding married, on May 31st, 1859, Miss Eliza P. Gould, daughter of William P. Gould, a prominent planter of Greene County, Ala. He remained with the North-East and South-West Alabama Railroad until it suspended work, in the latter part of 1860, when he went to Mobile and built one or more street railroads in that city.

On the outbreak of the civil war Mr. Harding enlisted in the 20th Alabama Regiment. In April, 1862, he was detailed by the Confederate Government as Superintendent of Road Repairs on the Mobile and Ohio Railroad. He remained in that capacity until 1871, and became General Superintendent of the Alabama and Chattanooga (now A. G. S.) Railroad in 1872.

In June, 1874, Mr. Harding entered the Government service as United States Assistant Engineer on the Improvement of the Warrior River, Ala., and remained in charge of this important work for twenty-two years, until May, 1896, when he resigned his position and retired from active life, thus closing a long and busy professional career, about which the least that can be said is "well done, thou good and faithful servant." During the last years of his engineering work he designed and built in the Warrior River, at Tuscaloosa, Ala., at a cost of over half a million dollars, three handsome masonry locks and dams, which will stand as an enduring monument to his professional ability.

He spent the closing years of his life in Birmingham, Ala., and died of typhoid fever after a short illness, while on a visit to relatives

* Memoir prepared by R. C. McCalla, M. Am. Soc. C. E.

in Grand Rapids, Mich. He leaves two sons, William P. G. Harding and Captain Chester Harding, Corps of Engineers, U. S. A.

Mr. Harding was a son of Chester Harding, a noted artist of Boston, who painted many famous portraits both here and abroad during the first half of this century.

Mr. Harding was a man of rare qualities of mind and heart, and enjoyed the confidence and esteem of all who knew him. An able engineer, a talented inventor, a versatile writer; upright, generous and gentle to a fault; he lived and died without a selfish thought, and with a charity as broad as the Universe. Were there more like him the world would be better off.

Mr. Harding was elected a Member of the American Society of Civil Engineers, November 2d, 1892.